HATCHERY EVALUATION REPORT

Turtle Rock - Summer Chinook

December 1996

Integrated Hatchery Operations Team (IHOT)

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Turtle Rock - Summer Chinook

An Independent Audit Based on Integrated Hatchery Operations Team (IHOT) Performance Measures

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CONTENTS

List of Tables

Table

Section 1

Executive Summary

This report presents the findings of the independent audit of the Turtle Rock - Summer Chinook program. The Turtle Rock Hatchery is located along the Columbia River 2 miles upstream from Rocky Reach Dam. The hatchery includes the old Rocky Reach Hatchery, located just downstream from Rocky Reach Dam. The hatchery is used for incubation and rearing of summer chinook and the rearing of steelhead.

The audit was conducted in 1996-1997 as part of a 2-year effort that will include 67 hatcheries and satellite facilities located on the Columbia and Snake River system in Idaho, Oregon, and Washington. The hatchery operating agencies include the U.S Fish and Wildlife Service, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife.

Background

The audit is being conducted as a requirement of the Northwest Power Planning Council (NPPC) "Strategy for Salmon" and the Columbia River Basin Fish and Wildlife Program. Under the audit, the hatcheries are evaluated against policies and related performance measures developed by the Integrated Hatchery Operations Team (IHOT). IHOT is a multi-agency group established by the NPPC to direct the development of new basinwide standards for managing and operating fish hatcheries. The Bonneville Power Administration (BPA) contracted with Montgomery Watson to act as an independent contractor for the audit.

IHOT has established five basic policies that cover: (1) hatchery coordination, (2) hatchery performance standards, (3) fish health, (4) ecological interaction, and (5) genetics. The audit focuses on all these policies, with the exception of hatchery coordination. These policies are set forth in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995).* That document is the source for the performance measures that are the basis of this audit.

The Audit Process

The audit was based on the facility management's response to a 109-page questionnaire. This audit form was completed through a five-step process in which:

- Information was obtained from headquarters.
- The hatchery manager was asked to fill out and return the audit form.
- A 1-2 day site audit visit was conducted to inspect facilities, review hatchery records, discuss audit form responses, and develop remedial action plans.
- A compliance report was developed to document the compliance status of each performance measure. This report was then shared with the hatchery manager and IHOT representative.

- This hatchery evaluation report was written to document compliance with IHOT performance measures and develop cost estimates for remedial actions when needed.

Turtle Rock - Summer Chinook Results

The Turtle Rock Hatchery includes one rearing pond, 8 vinyl-lined raceways, and incubation facilities. The Turtle Rock Hatchery is operated as mitigation facilities for the fishery impacts caused by the construction and operation of Rocky Reach Dam.

The Turtle Rock - Summer Chinook program was in compliance with few of the performance measures. This was primarily a result of failing to fill out the audit form and/or provide the required information to the audit team.

The specific areas in which the Turtle Rock - Summer Chinook program requires remedial actions based on the IHOT performance measures are listed below. These remedial actions are listed in alphabetical order without intent of ranking or otherwise assigning priority:

- Conduct fishery contribution studies
- Develop alarm logs
- Develop approved genetics monitoring and evaluation program
- Develop disease-free water supply for incubation and early rearing
- Develop monitoring and evaluation plan
- Develop smoltification goal and monitor
- Develop specific incubation and rearing standards for IHOT Operations Plan
- Document adult contribution, smolt production, and smolt to adult survival
- Document compliance with IHOT density and loading criteria for ponds
- Document DO and TGP levels
- Follow IHOT density criteria just prior to release
- Follow IHOT incubation standards for loading and flow criteria
- Follow IHOT QA/QC for feed preparation
- Follow IHOT requirements for storage of buckets of feed
- Install alarms in incubation facilities
- Install alarms in raceway headboxes and rearing ponds
- Install security alarms
- Modify program and rearing to meet release goal
- Replace intake screens at Turtle Rock
- Review IHOT Operations Plan and discussion with staff
- Review IHOT temperature criteria for incubation and rearing
- Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, and contaminants

Non-compliance issues resulting from items beyond human control or Performance Measures not relevant to this hatchery (Type 1 in Table 3, Section 4 of this report) were not listed above.

Section 2

Facility Description

Name: Turtle Rock Hatchery

Stock/Species: Summer Chinook
Steelhead

Operating Agency: Washington Department of Fish and Wildlife

Funding Agency: Chelan PUD

Location: The Turtle Rock Hatchery is located along the Columbia River 2 miles upstream from Rocky Reach Dam. The hatchery includes the old Rocky Reach Hatchery, located just downstream from Rocky Reach Dam.

Address: Turtle Rock Hatchery
Eastbank Fish Hatchery Complex
Washington Department of Fish and Wildlife
13246 Lincoln Rock Road E
East Wenatchee, WA 98802

Hatchery Manager: Mr. Steve Robards

Phone: (509) 884-8301
Fax: (509) 886-0823

Purpose: The Turtle Rock Hatchery is operated as mitigation facilities for the fishery impacts caused by the construction and operation of Rocky Reach Dam.

Production Goal:

Summer Chinook

Produce 200,000 yearling summer chinook for release from Turtle Rock Hatchery

Produce 1,600,000 subyearling summer chinook for release from Turtle Rock Hatchery

Steelhead

No information supplied

Water Supply: Water available for use in the Turtle Rock Hatchery averages 12,000 gpm and is from the Columbia River. Water rights for the Rocky Reach Satellite total 3,613 and are from the Columbia River

Facilities:

Adult Holding:	None
Incubation:	None
Early Rearing:	None
Raceways:	None
Rearing Ponds:	1 concrete rearing pond - 29,700 cf
Satellite Facilities:	Rocky Reach Satellite
	40 8-stack vertical incubators (320 trays)
	8 vinyl-lined raceways - 1,600 cf each

Section 3

Compliance Status

The hatchery audits are based on compliance with written IHOT performance measures. These performance measures are documented in ***Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*** (referred to as *IHOT 1995* in this report).[1] The purpose of the performance measures is to implement new basinwide policies that provide regional guidelines for operating anadromous hatcheries in the Columbia Basin.

The audit focuses on performance measures for IHOT policies that cover (1) hatchery performance standards, (2) fish health, (3) ecological interaction, and (4) genetics. These performance measures are intended to guide hatchery operations once production is established. For that reason, the hatchery operations audit included broodstock collection, spawning, incubation of eggs, fish rearing and feeding, fish release, equipment maintenance and operations, and personnel training. Production priorities are beyond the scope of this audit.

Based on *IHOT 1995*, a detailed 109-page audit form was developed. The audit form divided the performance measures into six major sections along major program and technical criteria areas. Two additional sections (sections 1 and 8) include general information and expenditure information needed for this Hatchery Evaluation Report and blank forms for additional comments. The following is the basic structure of the IHOT audit form:

Section 1	Performance Measures for General Information and Expenditure Information (PMs General 1-2)
Section 2	Performance Measures for Program Objectives (PMs 1-4)
Section 3	Performance Measures for Facility Requirements (PMs 5-15)
Section 4	Performance Measures for Hatchery Practices (PMs 16-25)
Section 5	Performance Measures for Fish Health Policy (PMs 26-34)
Section 6	Performance Measures for Ecological Interactions (PMs 35-38)
Section 7	Performance Measures for Genetics Policy (PMs 39-43)
Section 8	Blank Forms for Additional Comments

Several performance measures are repeated in various sections of the audit form. These performance measures overlap in *IHOT 1995* and were retained to allow individuals interested in specific portions of the audit (such as Genetics or Fish Health) to determine the compliance status of all performance measures for a given topic in one location. A repeated performance measure is indicated by shaded text.

The Hatchery Audit Process

The hatchery audit will be conducted over a 2-year period that concludes in 1997. At each hatchery, a five-step process was used to complete the overall hatchery audit. This process

[1]Integrated Hatchery Operations Team (IHOT) 1995. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*, Bonneville Power Administration, Portland, Oregon.

consisted of research and onsite visits. The site visit at the Turtle Rock Hatchery was conducted on October 29, 1996.

The following is the five-step audit process:

1. Information was obtained from headquarters.

2. The hatchery manager was asked to fill out and return the **Audit Form**.

3. A 1-2 day site audit visit was conducted at each hatchery. During that visit an audit team inspected facilities, reviewed hatchery records, discussed audit form responses, and developed remedial action plans when appropriate.

4. During the site visit, the compliance status of each performance measure was discussed with the hatchery manager and IHOT representative. A portion of the Hatchery Evaluation Report was sent to the hatchery manager following the audit visit as a **Compliance Report**. That Compliance Report is Table 2 of this report.

5. Information from steps 1-4 was used to prepare a draft **Hatchery Evaluation Report**. This draft report was submitted to the operating agencies for review of the information used to determine compliance. Based on review and comments, a final Hatchery Evaluation Report was developed. The final report documents the compliance of a particular hatchery with the IHOT performance measures and presents cost estimates to correct any deficiencies.

Compliance Status of Turtle Rock - Summer Chinook

The following table includes information on life-stages that are held on this facility for some portion of their rearing cycle (Table 1). For multi-facility programs, summary cost and contribution data is presented at the facility where rearing occurs. For the compliance status relating to performance measures that do not occur at this hatchery, please refer to the Hatchery Evaluation Reports for the hatcheries and stocks listed in Table 1. A check mark (✔) indicates that the specific life-stage is held at this facility.

This section documents the compliance status of the Turtle Rock - Summer Chinook program. Each performance measure is presented in a table taken from the audit form (Table 2). The compliance status is identified by the following categories:

- **N/A** (not applicable)
- **Yes** (in compliance)
- **?** (unknown; generally due to unavailability of information to determine compliance)
- **No** (not in compliance).

Remedial actions are suggested for performance measures not in compliance. These remedial actions are grouped into categories and listed in Section 4 of this report, where the cost of the required remedial actions is also presented.

Table 1 Summary Program Information for Turtle Rock - Summer Chinook

Component	Location of Adult Holding, Spawning, Incubation, and Rearing					
	Wells Hatchery	Rocky Reach Annex	Turtle Rock Hatchery			
Adult Collection	✔					
Adult Holding	✔					
Spawning	✔					
Fertilization	✔					
Incubation						
green-to-eyed	✔					
eyed-to-hatch		✔				
Rearing						
fry		✔				
fingerlings		✔				
smolts			✔			
Acclimation/release			✔			

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
the hatchery programs outlined in a subbasin nagement plan?		✔			Columbia Basin System Planning Production Plan and FERC Agreement (Rocky Reach Dam)	
ne hatchery operating under a current hatchery rational plan?				✔	IHOT Operations Plan.	Review IHOT Operations Plan
s it understood by staff?				✔	See above	Discuss Operations Plan with staff
s it being followed?				✔	See above	Discuss Operations Plan with staff
hatchery monitoring and evaluation plan in place?						
Do you have a written monitoring and evaluation plan?				✔	No plan	Develop monitoring and evaluation plan
ult contribution to fisheries, spawning grounds, and chery			✔		No information provided	Document adult contribution
ult pre-spawning survival as compared with blished goal	✔				Adults collected at Wells Hatchery	
-take as compared with established hatchery goal	✔				Adults collected at Wells Hatchery	
en-egg to eyed-egg survival as compared with blished goal	✔				Incubation at Wells Hatchery	
d-egg to fry survival as compared with established l		✔			Review of data; in compliance 5 out of last 5 years	
to smolt survival as compared with established goal		✔			Review of data; in compliance 5 out of last 5 years	
duction as compared with established goal			✔		No information provided	Document smolt production
cent survival (smolt to adult) as compared with blished goal			✔		No information provided	Document smolt to adult survival
nber of eggs, fry, fingerlings, smolts, and/or adults neet basinwide needs	✔				No information provided	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
mperature						
Does your water temperature meet the criteria for spawning?	✔				No spawning at Turtle Rock Hatchery	
Does your water temperature meet the criteria for ncubation?				✔	Review of data	Review IHOT temperature criteria for incubation
Does your water temperature meet the criteria for earing?				✔	Review of data. Use ambient Columbia River; too warm/too cold.	Review IHOT temperature criteria for rearing
solved gases						
s the oxygen level near saturation?			✔		System designed for compliance for oxygen and nitrogen	Document DO levels
s the dissolved nitrogen level less than saturation?			✔		See above	Document TGP levels
emistry						
mmonia (un-ionized)			✔		No data provided	Run analysis for chemistry parameters
Carbon Dioxide			✔		See above	See above
Chlorine			✔		See above	See above
H			✔		See above	See above
Copper			✔		See above	See above
Hydrogen Sulfide			✔		See above	See above
ron			✔		See above	See above
inc			✔		See above	
bidity						
Does your turbidity meet the criteria?			✔		No data provided	Run analysis for turbidity

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
alinity and hardness						
)oes your alkalinity and hardness meet the criteria?			✔		No data provided	Run analysis
rite						
)oes your nitrite meet the criteria?			✔		No data provided	Run analysis
Contaminants						
ıldrin			✔		No data provided	Run analysis
ndrin			✔		No data	See above
)ieldrin			✔		No data	See above
Heptachlor			✔		No data	See above
Chlordane			✔		No data	See above
Methoxychlor			✔		No data	See above
indane			✔		No data	See above
Malathion			✔		No data	See above
Guthion			✔		No data	See above
hogens						
What portions of the hatchery have disease-free water?						
Adult holding	✔				Adult holding at Wells Hatchery	
Incubation				✔	Seep water	Develop disease-free water supply for incubation
Early rearing				✔	Seep water	Develop disease-free water supply for early rearing
Rearing				✔	River water	Review IHOT requirement for disease-free water for rearing
Others	✔					

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
rm Systems						
)o the following areas have alarms?						
Intake		✔			Call in alarms from PUD	
Large rearing ponds and adult holding ponds	✔				Inspection/Discussion	
Raceway headboxes and rearing ponds				✔	Inspection/Discussion	Install alarms in raceway headboxes and rearing ponds
Incubation facilities				✔	Inspection/Discussion	Install alarms in incubation facilities
Quarantine areas and facilities	✔				Inspection/Discussion	
Water treatment systems	✔				Inspection/Discussion	
Security				✔	Inspection/Discussion	Install security alarms
ıre there outside systems and buzzers in onsite esidences?		✔			Discussion	
ıre water flow alarms checked daily?		✔			Review of records/Discussion	
ıre all other alarms checked weekly?		✔			Discussion	
s there a log of alarms for emergencies, tests, and ıaintenance requirements?				✔	Discussion	Develop alarm log
ıre telephone pagers used?		✔			Discussion; duty person wears page	
ılt collection and holding facilities						
)o you meet the adult holding criteria?	✔				No adult held at hatchery	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ıbation facilities						
'ype 1: vertical flow through)o you have an adequate number of units for the verall program?		✔			Discussion	
'ype 2: _____)o you have an adequate number of units for the verall program?	✔					
ıring facilities						
'ype 1: raceways)o you have an adequate number of units for the verall program?		✔			Discussion	
'ype 2: ponds)o you have an adequate number of units for the verall program?		✔			Discussion	
'ype 3: _____)o you have an adequate number of units for the verall program?						
eening facilities						
)o you meet the approach velocity criteria?				✔	Inspection of facilities/Discussion.	Replace intake screens at Turtle Rock
ıre the fish screens regularly cleaned?		✔			Inspection of facilities/Discussion.	
)oes the screen mesh meet screen opening criteria?				✔	Inspection of facilities/Discussion.	See above
ıre rearing containers double screened for fish that hould not be released to adjacent water?	✔				Released on station	
dator control facilities						
ıre your predation control facilities effective?		✔			Inspection	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
d storage facilities and quality control						
)oes the storage of dry/semi-moist/moist foods dry<12%; semi-moist 12-20%; moist >20% moisture) ollow food manufacturer's recommendations?		✔			Inspection of facilities/Discussion	
)oes a regional quality control officer oversee roduction procedures and monitor:						
Verification by feed manufacturer that ingredients meet specifications?				✔	Discussion	Follow IHOT QA/QC for feed preparation
Ensure feed does not contain unwanted drugs or other additives?				✔	Discussion	Follow IHOT QA/QC for feed preparation
Analyze ingredients contained in the final food product to ensure that feed specifications have been met?				✔	Discussion	Follow IHOT QA/QC for feed preparation
ıre the foods stored and handled according to the ollowing criteria?						
Moist pellets should not exceed 10 °F at point of delivery.		✔			Discussion	
Moist pellets should be removed from freezer just prior to feeding.		✔			Discussion	
Do not leave buckets of feed or feed containers outside exposed to light or heat.				✔	Discussion	Follow IHOT requirements for storage of buckets of feed
Open bags of feed should be fed within 1 to 2 days except when feeding small groups of fish.		✔			Discussion	
Automatic feeder hoppers and bulk storage facilities should be insulated against excessive temperatures (80°F and above).		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ease facilities						
)o the release facilities ensure that fish are not ubjected to adverse conditions?		✔			Inspection of facilities/Discussion	
lution abatement facilities						
)o the pollution abatement facilities meet all federal nd state regulations (or good engineering practice)?		✔			Inspection of facilities/Discussion	
ıre pollution abatement facilities operated correctly?		✔			Discussion	
nsportation facilities						
ıre the transport systems adequate to meet IHOT erformance measures for transportation practices?		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
odstock selection practices						
s the donor selection process document attached? (PM 40a)	✔				Existing program; does not apply	
Was the donor selection outline followed in selecting ne hatchery broodstock? (PM #40b-c)	✔				Existing program; does not apply	
wning practices						
Were the appropriate number of spawners, male/female atios, and fertilization protocols used? (PM #42c-g)	✔				Spawning at Wells Hatchery	
ıbation practices						
specific incubation standards listed in the hatchery rations plan?				✔	Review of IHOT Operations Plan	Develop specific incubation standards for IHOT Operations Plan
incubation practices written?				✔	No plan; used lower flow than criteria	See above
ıbation Type 1: vertical (see PM #8) you meet the loading and flow criteria?				✔	Review of records/Discussion	Follow IHOT criteria for loading and flow criteria
ıbation Type 2: (see PM #8) you meet the loading and flow criteria?	✔					

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ring practices						
specific rearing standards listed in the hatchery rations plan?				✔	Review of IHOT Hatchery Operations Plan	Develop specific rearing standards for IHOT Operations Plan
rearing practices written?				✔	Review of Hatchery Operations Plan	See above
earing Unit Type 1: raceways (see PM #9)						
Do you meet the density and DI criteria?		✔			Review of records/Discussion; related to Piper's indices.	
Do you meet the Loading and FI criteria?		✔				
earing Unit Type 2: ponds (see PM #9)						
Do you meet the density and DI criteria?			✔		No information provided	Document compliance with IHOT density and loading criteria for ponds
Do you meet the Loading and FI criteria?			✔		No information provided	See above
earing Unit Type 3: (see PM #9)						
Do you meet the density and DI criteria?	✔					
Do you meet the Loading and FI criteria?	✔					
olt quality						
Do you produce a high quality smolt?		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
n health management practices						
re the monthly hatchery monitoring visits being onducted? (PM #26)		✔			Review of records/Discussion	
re the annual broodstock inspections being conducted? PM #27)	✔				At Wells Hatchery	
s there pathogen-free water (PM #5h) and are the anitation procedures being followed? (PM #28)				✔	Review of records/Discussion	See PM #5h
re the following water quality parameters within riteria? (PM #5a-5g)						
Water temperature				✔	Review of records/Discussion	See PM 5a
Dissolved gases			✔		No data	See PM 5b
Chemistry			✔		No data	See PM 5c
Turbidity			✔		No data	See PM 5d
Alkalinity and hardness			✔		No data	See PM 5e
Nitrite			✔		No data	See PM 5f
Contaminants			✔		No data	See PM 5g
re rearing standards being followed? (PM #19)				✔	Review of records/Discussion	See PM #19
re egg and fish transfer/release requirements met? PM #31)		✔			Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
s hatchery performance meet requirements lined in the regional hatchery policies and in basin and hatchery plans for the following areas?						
cent smoltification						
Do you measure percent smoltification?				✔	Discussion	Develop smoltification goal and monitor
Did you meet the smoltification criteria?			✔		Discussion	See above
ring density (prior to release)						
Did you meet the rearing density criteria just prior to elease?				✔	Discussion	Follow IHOT density criteria just prior to release
ease condition (at release)						
Did you meet all disease regulations just prior to elease?		✔			Discussion	
nber (at release)						
Did you meet the release number goal?				✔	Discussion	Modify program and rearing to meet release goal
at release						
Did you meet the size goal?		✔			Discussion	
es of release						
Did you meet the release date goal?		✔			Discussion	
ation of release						
Did you release the fish at the specified location?		✔			Discussion	
fish reared in the subbasin or acclimated in the basin?						
are the fish reared in the subbasin?		✔			Discussion	
are the fish acclimated in the subbasin?		✔			Discussion	
ne release strategy appropriate for the program?		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
nsportation facilities						
)o transportation equipment and personnel receive isinfection before and after use?	✔				Transport by Eastbank Hatchery	
s the fish tank interior disinfected using a solution of 00 ppm active chlorine for 30 minutes minimum or ormaldehyde gas generation method (relative humidity f 60% for 2 hrs)?	✔				See above	
Is the exterior of the fish transport vehicle disinfected using high pressure steam (115-130°C), high temperature acid, or with 200 ppm chlorine for 30 minutes?	✔				See above	
s the fish transport vehicle (cab) disinfected using 600 pm quaternary ammonia compounds (1.5 ml of 50% tock solution/liter water)?	✔				See above	
s other equipment disinfected including fish pumps, ets, egg sorters, waders, boots, rain gear, hoses and ther equipment using one of the following solutions?	✔				See above	
200 ppm chlorine for 30 minutes 600 ppm quaternary ammonia compound for 30 minutes 200 ppm iodophor solution for 10 minutes	✔				See above	
)o personnel wear protective garments when handling sh eggs or cultural water?	✔				See above	
)o the fish transport truck/chassis and tank/unit receive n inspection and service prior to the release season?	✔				See above	
s a daily service inspection completed before starting p and leaving for the day?	✔				See above	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
nsportation facilities						
)oes the fish transport unit receive an inspection prior) loading?	✔				Transport by Eastbank Hatchery	
)oes a pre-loading inspection covering tank water evel, pumps or aerators, oxygen injection system ettings, displacement gauge, and truck loading/hauling ensity tables checked and reviewed occur prior to)ading fish in the transport unit?	✔				See above	
)o hauling criteria include checking the fish 45 minutes) 1 hour after loading?	✔				See above	
Vhen fish are active and systems are functioning roperly, is the oxygen concentration reduced and ıaintained at approximately 8 ppm?	✔				See above	
; water temperature in the transportation unit ıaintained within the 42-48 °F range?	✔				See above	
)o fish releasing procedures include the following riteria?						
Releasing the fish at the correct release site or into the correct water body.	✔				See above	
Tempering or the difference between the liberation tank and the target water body should not exceed 10°F.	✔				See above	
The liberation hose should be angled so that fish gently hit the water. Using a tripod is a method of ensuring the hose will stay at the proper angle.	✔				See above	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
luation practices						
las the hatchery conducted fishery contribution studies):						
Determine the requirements for evaluating and improving management programs?				✔	Discussion	Conduct fishery contribution studies
Develop guidelines that define the geographical area and identify component stocks (hatchery and/or wild) that comprise the management unit?				✔	Discussion	See above
Develop guidelines that define if the proper stocks of fish are currently being used?				✔	Discussion	See above
Determine which management units contribute to a specific fishery and the time periods of those contributions?				✔	Discussion	See above
Determine the relative contributions of the various management units to a specific fishery over the different time periods?				✔	Discussion	See above

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ining practices						
Does the hatchery have a training schedule for its staff?		✔			Discussion	
Does each staff member have a personal training plan approved by a supervisor and reviewed annually?		✔			Discussion	
Does the hatchery routinely exchange training details between other hatcheries and agencies?		✔			Discussion	
Does the hatchery encourage and reward off-duty training of staff?		✔			Discussion	
Does the hatchery conduct monthly staff meetings?		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
monthly hatchery monitoring visits being ducted by a qualified fish health specialist as cribed below?						
Conduct visit at least monthly		✔			Inspection of records/Discusion	
Monitoring conducted by qualified fish health specialist		✔			See above	
Examine a representative sample of healthy and moribund fish from each lot.		✔			See above	
Review fish culture practices with hatchery manager.		✔			See above	
Report finding and results of necropsies on standard form.		✔			See above	
Recommend appropriate drug or chemical treatment.		✔			See above	
Summarize fish health status or stock prior to release or transfer to another facility.		✔			See above	
all of the functions of the hatchery yearly nitoring visits being completed as described below?						
Annually examine each broodstock for the presence of reportable viral pathogens.	✔				At Wells Hatchery	
Annually screen each salmon broodstock for the resence of *Renibacterium salmoninarum*.	✔				See above	
Conduct inspection by or under the supervision of ualified fish health specialist.	✔				See above	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ıe hatchery following accepted sanitation cedures?						
ıre there any sources of pathogen-free water, especially ɔr incubation and early rearing?				✔	Discussion	Develop pathogen-free water supply for incubation and early rearing
ıre the hatchery sanitation procedures understood and eing followed as described below?						
Disinfect/water harden eggs in iodophor?	✔				No incubation at this hatchery	
Are foot baths containing disinfectant placed at the incubation facility's entrance and exit?		✔			Discussion	
Is equipment and rain gear utilized in broodstock handling or spawning sanitized prior to its use elsewhere in the hatchery?		✔			Discussion	
Is equipment used to collect dead fish sanitized prior its use in another pond and/or lot of fish?		✔			Discussion	
Is equipment, including vehicles used to transfer fish between facilities, disinfected prior to use with any other fish lots or at any other location?		✔			Discussion	
Are rearing vessels sanitized after fish are removed and prior to introducing a new fish lot or stock?		✔			Discussion	
Are dead fish properly disposed of?		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
water quality parameters being followed?						
re the following water quality parameters within riteria? (PM #5a-5g)						
Water temperature				✔	Review of records/Discussion	See PM #5a
Dissolved gases			✔		No data	See PM #5b
Chemistry			✔		No data	See PM #5c
Turbidity			✔		No data	See PM #5d
Alkalinity and hardness			✔		No data	See PM #5e
Nitrite			✔		No data	See PM #5f
Contaminants			✔		No data	See PM #5g
o to PM #21						
incubation and rearing standards being followed?						
Are the incubation practices following the IHOT incubation criteria? (PM #18)				✔	No plan; not meeting criteria	See PM #18
Are the rearing practices following the IHOT criteria? (PM #19)				✔	No plan; rearing conditions in ponds not documented	See PM #19
o to rearing practices PM #18-PM #19						
egg and fish transfer/release requirements met?		✔			Cleared by Tami Black	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ne hatchery's program outlined in a subbasin nagement plan? Go to subbasin plan PM #1		✔			Columbia Basin System Planning Production Plan and FERC Agreement	
ne hatchery operating under a current hatchery rational plan? Go to operational plan PM #2				✔	Review of IHOT Operations Plan	See PM #2
hatchery monitoring and evaluation plan in place? Go to hatchery monitoring and evaluation plan PM #3				✔	No information provided	See PM #3

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
s the hatchery program meet requirements blished in the regional hatchery policies and basin planning documents in the following areas: cies, stock, broodstock collection location, odstock numbers, broodstock collection strategy, spawning and egg-take protocols?						
Does the hatchery program meet the requirements for he following?						
Species protocols (PM #4a)	✔				At Wells Hatchery	
Stock protocols (PM #4a)	✔				Discussion	
Broodstock collection location protocols (PM #41b)	✔				No broodstock collected in this hatchery	
Broodstock numbers protocols (PM #42c)	✔				See above	
Broodstock collection strategy protocols (PM #41b-d)	✔				See above	
Spawning protocols (PM #42d-e)	✔				See above	
Egg-take protocols (PM #42f-g)	✔				See above	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
s the hatchery's performance meet requirements ined in the regional hatchery policies and in basin and hatchery plans for the following areas: cent smoltification, rearing density, disease dition, and the number, size date(s), and location of ase?						
ercent smoltification (PM #22a1)				✔	Discussion	See PM #22a1
earing density (PM #22a2)				✔	Discussion	See PM #22a2
isease condition (PM #22a3)		✔			Discussion	
umber at release (PM #22a4)				✔	Review of records/Discussion	See PM #22a4
ize at release (PM #22a5)		✔			Review of records/Discussion	
ate of release (PM #22a6)		✔			Review of records/Discussion	
ocation of release (PM #22a7)		✔			Review of records/Discussion	
fish reared in the subbasin or acclimated in the basin? PM #22b		✔			Discussion	
e release strategy appropriate for the program? PM #22c		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
new programs, has a broodstock collection plan n developed?						
s the broodstock collection plan written?	✔				Existing Program; does not apply	
or a non-captive broodstock program:	✔				Existing Program; does not apply	
Was an unbiased, representative sample collected?						
Was the recommended number of broodstock collected?	✔				Existing Program; does not apply	
or a captive broodstock program:						
Were captive brood progeny excluded as donors for propagating the next generation of the captive broodstock program?	✔				Existing Program; does not apply	
Were full-sib crosses avoided?	✔				Existing Program; does not apply	
s the broodstock collection plan understood and being ollowed by staff?	✔				Existing Program; does not apply	
a new program, was the donor selection outline owed in selecting the hatchery broodstock?						
s a donor selection plan written?	✔				Existing Program; does not apply	
Was the donor selection outline followed in selecting ne broodstock?	✔				Existing Program; does not apply	
Was the target stock recommended in the donor election process actually used?	✔				Existing Program; does not apply	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
existing programs, were the broodstock collection cedures followed?						
s the broodstock collection plan written?	✔				No broodstock collected at this hatchery	
Does the broodstock collection plan follow the uideline:					See above	
Was an unbiased, representative sample collected?	✔				See above	
Was the recommended number of broodstock collected?	✔				See above	
Were the broodstock collection procedures in hatchery operation plan understood and followed?	✔				See above	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
s the appropriate number of spawners, male/female os, and fertilization protocols used?						
ıre the spawning protocols written?	✔				No spawning at this hatchery	
ıre daily or weekly spawning logs available?	✔				See above	
Vas the appropriate number of spawners used?	✔				See above	
)id you attempt to spawn all collected broodstock and ındomize mating with respect to age class, and other ·aits?	✔				See above	
Vas the sex-ratio within the limits given in the erformance standards?	✔				See above	
Vere the fertilization protocols followed?	✔				See above	
: the hatchery needed to reduce the number of eggs etained, was this done by representative sampling of ach male/female cross?	✔				See above	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ıere a genetics monitoring and evaluation program lace?						
; a genetics monitoring and evaluation program vailable?				✔	No plan	Develop approved genetics monitoring and evaluation program
)oes the plan address the following elements listed in HOT:						
Does the program have elements needed to meet evaluation goals 1-4?				✔	Discussion	See above
Has a qualified geneticist reviewed and endorsed the program (goal 5)?				✔	Discussion	See above
Will the program collect the data and maintain the records needed to evaluate compliance on an ongoing basis (goal 5)?				✔	Discussion	See above
Is the program understood and followed by staff?				✔	Discussion	See above

Section 4

Remedial Actions

Based on the compliance status for each performance measure, remedial actions were developed. The required remedial actions are organized into five categories. The types of categories range across a spectrum from those actions that are beyond human control, to those that require a change in agency policy or procedures, to those that involve a significant capital cost to put in place. The following are the five types of remedial actions identified under phase 1 of the audit:

The Five Types of Remedial Actions

Type	Description
1	Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery
2	Remedial actions requiring changes in agency policies or procedures
3	Remedial actions requiring changes in monitoring coverage or interval
4	Remedial actions requiring significant capital expenditures
5	Remedial actions that may require significant capital expenditures but are not clearly definable at this time

Remedial Actions at Turtle Rock - Summer Chinook

This section presents the corrective actions required to bring the Turtle Rock - Summer Chinook program into compliance with IHOT performance measures. The remedial actions suggested here are just that, suggestions developed by the Montgomery Watson Audit Team. For some non-compliance areas, other remedial actions could be proposed. The required remedial actions are cross-referenced to each IHOT performance measure that was not in compliance. Where appropriate, the costs associated with the remedial actions are also presented (Table 3).

The cost estimates presented in this section are based on professional experience from similar projects. In most cases, only a lump-sum figure is presented, and detailed take-off lists have not been prepared. The cost estimates are essentially order of magnitude estimates (± 40%).

More importantly, the suggested remedial activities may also present several levels of action. Optional actions have been listed for several problems. These optional actions are desirable for either operational or safety considerations.

Table 3. Remedial Actions Required at Turtle Rock - Summer Chinook

Remedial Action Required	Cost	PMs[1]
Type 1 - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery		
None	----	
Type 2 - Remedial actions requiring changes in agency policies or procedures		
Review IHOT Operations Plan and discussion with staff	----	2
Develop monitoring and evaluation plan	----	3
Document adult contribution, smolt production, and smolt to adult survival	----	4a, 4g, 4h
Review IHOT temperature criteria for incubation and rearing	----	5a
Develop alarm logs	----	6
Follow IHOT QA/QC for feed preparation	----	12
Follow IHOT requirements for storage of buckets of feed	----	12
Develop specific incubation and rearing standards for IHOT Operations Plan	----	18-19
Follow IHOT incubation standards for loading and flow criteria	----	18
Document compliance with IHOT density and loading criteria for ponds	----	19
Develop smoltification goal and monitor	----	22a1
Follow IHOT density criteria just prior to release	----	22a2
Modify program and rearing to meet release goal	----	22a4
Conduct fishery contribution studies	----	24
Develop approved genetics monitoring and evaluation program	----	43

[1] PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.

Remedial Action Required	Cost	PMs[1]
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Document DO and TGP levels	----	5b
Run analysis for water chemistry parameters, turbidity, alkalinity, hardness, and contaminants	----	5c-5g
Type 4 - Remedial actions requiring significant capital expenditures		
Install alarms in raceway headboxes and rearing ponds	$10,000	6
Install alarms in incubation facilities	$5,000	6
Install security alarms	$5,000	6
Replace intake screens at Turtle Rock	replacement underway	10
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Develop disease-free water supply for incubation and early rearing	----	5h, 28

[1] PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.

Section 5

Hatchery Contribution to Fisheries, Spawning Grounds, and Hatcheries

This section presents the audit findings for the Turtle Rock - Summer Chinook program contribution of adult fish to fisheries, local fisheries, spawning grounds, and hatcheries. Data is reported by broodyear. A broodyear refers to the adult contribution from the eggs produced from a single group of spawning adults. For some species, this may include fish caught as 2-, 3-, 4-, 5-, and 6-year old fish. Because of the return distribution and data processing delays, the complete adult contribution for a given broodyear may not be available until 4 to 5 years after the fish have been released from the hatchery.

Table 4. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries: Turtle Rock - Summer Chinook

Year	Fisheries[1] (Broodyear)	Spawning Grounds[1] (Broodyear)	Hatchery[1] (Broodyear)	Total Combined Contribution[2] (Broodyear)	Smolt to Adult Survival (percent)
1984					
1985					
1986					
1987	No information provided	No information provided	No information provided	No information provided	No information provided
1988	No information provided	No information provided	No information provided	No information provided	No information provided
1989	No information provided	No information provided	No information provided	No information provided	No information provided
1990	No information provided	No information provided	No information provided	No information provided	No information provided
1991	No information provided	No information provided	No information provided	No information provided	No information provided
1992					

[1] Data obtained from Missing Production Groups Annual Report or from the Regional Mark Information System database.

[2] Total combined adult contribution; presented when it is not possible to subdivide the contribution into fisheries, spawning grounds, and hatchery contributions.

Section 6

Annual Operating Expenditures

The level and detail of annual operating expenditures varies widely depending on hatchery, operating agency, and funding source. When provided, expenditures were presented in terms of personnel costs, operating costs (power, feed, supplies), capital costs, indirect costs charged to the federal government, third-party costs, and other costs. These cost components were summed to determine a total hatchery annual cost. Based on discussion with the hatchery manager, the percent of total hatchery costs allocated to a given program was estimated. The total hatchery costs and the percent of hatchery costs allocated to a given program were used to compute the cost of a given program. Table 5 shows the annual operating expenses for the Turtle Rock - Summer Chinook program. For programs that occur at more than one facility (as shown on Table 1 in Section 3 of this report), the cost breakdown for the component(s) at each facility is presented in separate tables (Tables 5a and 5b).

Table 5. Annual Operating Expenses: Turtle Rock - Summer Chinook

Hatchery	**1994**	**1995**	**1996**
1. Turtle Rock Hatchery	Not possible to compute with the information supplied	Not possible to compute with the information supplied	Not possible to compute with the information supplied
2. Wells Hatchery	Not possible to compute with the information supplied	Not possible to compute with the information supplied	Not possible to compute with the information supplied
3.			
4.			
5.			
Total Program Costs	Not possible to compute with the information supplied	Not possible to compute with the information supplied	Not possible to compute with the information supplied

The total expenditures for the Turtle Rock Hatchery are presented in Table 6 by program. The detailed breakdown of program expenditures at this hatchery are presented in separate tables (Table 6a and 6b, 6c).

Table 6. Annual Operating Expenses - Turtle Rock Hatchery

Program	1994	1995	1996
1. Summer Chinook	Not possible to compute with the information supplied	Not possible to compute with the information supplied	Not possible to compute with the information supplied
2. Steelhead	Not possible to compute with the information supplied	Not possible to compute with the information supplied	Not possible to compute with the information supplied
3.			
4.			
5.			
Total Hatchery Costs	**$269,523**	**$315,898**	**$419,893**

Table 5a. Annual Operating Expenses: Turtle Rock - Summer Chinook

Expenditure Occurring at Turtle Rock

Component	1994	1995	1996
Personnel Costs	$130,620	$132,722	$152,294
Operational Costs	$76,188	$120,461	$204,884
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs[1]			
Lumped Third-Party Costs	$62,715	$62,715	$62,715
Total Hatchery Costs	**$269,523**	**$315,898**	**$419,893**
Source of Funds			
Chelan PUD			
Program Production (lb)			
Total Production (lb)			
Program as Percent of Total	No information provided	No information provided	No information provided
Program Costs	Not possible to compute with information provided	Not possible to compute with information provided	Not possible to compute with information provided

[1] When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

Table 5b. Annual Operating Expenses: Turtle Rock - Summer Chinook

Expenditure Occurring at Wells Hatchery

Component	1994	1995	1996
Personnel Costs			
Operational Costs			
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs[1]	$651,858	$627,609	$650,000
Lumped Third-Party Costs			
Total Hatchery Costs	**$651,858**	**$627,609**	**$650,000**
Source of Funds			
	100%	**100%**	**100%**
Program Production (lb)			
Total Production (lb)			
Program as Percent of Total	No information provided	No information provided	No information provided
Program Costs	Not possible to compute with the information supplied	Not possible to compute with the information supplied	Not possible to compute with the information supplied

[1] When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

Table 6a. Detailed Expenditures at Turtle Rock Hatchery by Program

Summer Chinook

Component	1994	1995	1996
Personnel Costs	$130,620	$132,722	$152,294
Operational Costs	$76,188	$120,461	$204,884
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs[1]			
Lumped Third-Party Costs	$62,715	$62,715	$62,715
Total Hatchery Costs	**$269,523**	**$315,898**	**$419,893**
Source of Funds			
Program Production (lb)			
Total Production (lb)			
Program as Percent of Total	No information provided	No information provided	No information provided
Program Costs	Not possible to compute with information provided	Not possible to compute with information provided	Not possible to compute with information provided

[1] When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

Table 6b. Detailed Expenditures at Turtle Rock Hatchery by Program

Steelhead

Component	1994	1995	1996
Personnel Costs	$130,620	$132,722	$152,294
Operational Costs	$76,188	$120,461	$204,884
Capital Costs			
Indirect Costs			
Lumped Hatchery Costs[1]			
Lumped Third-Party Costs	$62,715	$62,715	$62,715
Total Hatchery Costs	**$269,523**	**$315,898**	**$419,893**
Source of Funds			
Program Production (lb)			
Total Production (lb)			
Program as Percent of Total	No information provided	No information provided	No information provided
Program Costs	Not possible to compute with information provided	Not possible to compute with information provided	Not possible to compute with information provided

[1] When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.